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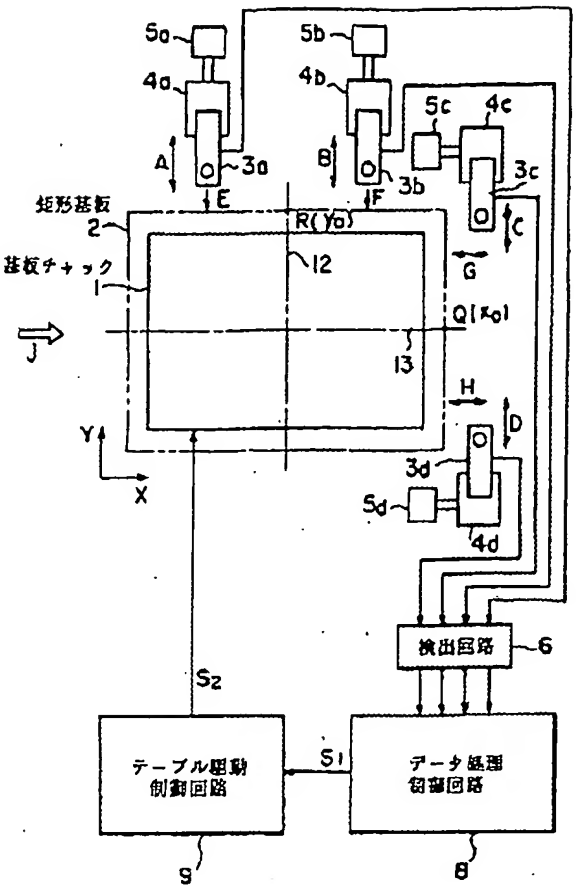
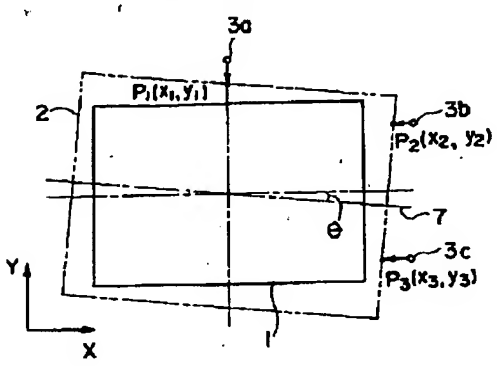
TITLE : POSITIONING DEVICE FOR RECTANGULAR SUBSTRATE



ABSTRACT : PROBLEM TO BE SOLVED: To easily cope with a change in reference line for different positioning at a user's request.

SOLUTION: This device has edge sensors 3a and 3b, and 3c and 3d, which optically detect the peripheral edges of two mutually adjacent sides of the rectangular substrate 2 held on the top surface of a substrate chuck 1, arranged two by two nearby the two mutually adjacent sides of the rectangular substrate chuck 1 at a specific distance. Further, the device is provided with position correcting means 8 and 9 which input position signals of the peripheral edges of the two orthogonal peripheral sides of the rectangular substrate 2 detected by the edge sensors 3a and 3b, and 3c and 3d, recognize their X-directional and Y-directional positions and θ-directional angles, and correct the position of the rectangular substrate 2 about its target position. Then the two edge sensors 3a and 3b, or 3c and 3d are switched and used according to which of the two orthogonal sides of the rectangular substrate 2 is employed as a reference line for recognizing the θ-directional angle of the rectangular substrate 2 to recognize and correct the θ-directional angle of the rectangular substrate 2. Consequently, the change in reference line for different positioning at a user's request can easily be coped with.



[Translation done.]

Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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FULL CONTENTS

[Claim(s)]

[Claim 1] Movement of the two dimensions of the direction of X, and the direction of Y, and the trolley table which can rotate the direction of theta, It has the substrate zipper of the shape of a rectangle which puts a rectangle board on the upper surface and is held while being fixed to the upper surface of this trolley table and carrying out movement of X, Y, and the direction of theta with this trolley table. In the positioning equipment of the rectangle board which positions the above-mentioned rectangle board to a predetermined target position to the optical system established above this substrate zipper While detaching only predetermined distance and arranging two edge sensors which detect optically the periphery of each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle board held on the upper surface of this substrate zipper near [each] each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle substrate zipper of the above A position amendment means to take in the position signal of the periphery of two sides of rectangular crosses of the rectangle board detected by every two above-mentioned edge sensors, to recognize the position of the direction of X and the direction of Y and the angle of the direction of theta, and to amend a position to the target position of this rectangle board is established. Positioning equipment of the rectangle board characterized by using every two above-mentioned edge sensors by whether which neighborhood of two sides of rectangular crosses of this rectangle board is taken as a standard line which recognizes the angle of the direction of theta of the above-mentioned rectangle board, switching them mutually, and carrying out recognition and amendment of the rectangle board of the angle of the direction of theta.

[Claim 2] Each above-mentioned edge sensor is positioning equipment of the rectangle board according to claim 1 characterized by enabling scanning operation for detecting the periphery of the above-mentioned neighborhood optically in the approach position while enabling approach or evacuation to the neighborhood where the rectangle board held on the upper surface of the substrate zipper corresponds.

[Claim 3] Each above-mentioned edge sensor is positioning equipment of the rectangle board according to claim 1 or 2 characterized by being a penetrated type or a reflected type photo sensor.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] In the substrate photolithography machine with which this invention prints the circuit pattern formed in the mask, for example on the rectangle boards (glass substrate etc.) held on the upper surface of the substrate zipper It is related with the positioning equipment of the rectangle board which positions a rectangle board to a predetermined target position to the optical system established above the above-mentioned substrate zipper on the occasion of position ****** of the above-mentioned mask and a rectangle board. It is related with the positioning equipment of a rectangle board which can respond to change of the standard line of positioning which changes with user requirements in what positions a large-sized rectangle board in the state of non-contact especially easily.

[0002]

[Description of the Prior Art] The trolley table which the positioning equipment of the conventional rectangle board rotates [movement of the two dimensions of the direction of X, and the direction of Y and] the direction of theta, It has the substrate zipper of the shape of a rectangle which puts a rectangle board on the upper surface and is held while being fixed to the upper surface of this trolley table and carrying out movement of X, Y, and the direction of theta with this trolley table. The above-mentioned rectangle board is positioned to a predetermined target position to the optical system established above this substrate zipper.

[0003] Drawing 4 is the plane explanatory view seen from the upper surface side of the rectangle board which shows the positioning equipment of the conventional rectangle board. In a figure, the rectangle boards 2, such as a glass substrate [being large-sized (400mm x 500mm or more)], are held by vacuum adsorption etc. on the upper surface of the rectangle-like substrate zipper 1. Near each neighborhood of two sides of adjacency ****** rectangular crosses of the above-mentioned substrate zipper 1, a total of three edge sensors 3a, 3b, and 3c were prepared. These edge sensors 3a, 3b, and 3c are what detects optically the periphery of each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle board 2 held on the upper surface of the above-mentioned substrate zipper 1. Along the periphery of one neighborhood (for example, the long side side), the first edge sensor 3a and the second edge sensor 3b detach only predetermined distance, and are arranged, and the third edge sensor 3c is formed in the central part of the periphery of the neighborhood (for example, the shorter side side) of another side which intersects perpendicularly with above-mentioned one neighborhood.

[0004] In addition, the approach and evacuation to the rectangle board 2 of each above-mentioned edge sensor 3a, 3b, and 3c are enabled by the cylinder 4a attached to each, 4b, and 4c like Arrow A, B, and C. Moreover, a pulse motor 5a, 5b, and 5c are attached to each above-mentioned cylinder 4a, 4b, and 4c, respectively, and scanning operation for said edge sensor 3a, 3b, and 3c to detect the periphery of the rectangle board 2 like Arrow D, E, and F is enabled. Furthermore, although the illustration abbreviation is carried out in drawing 4 R> 4, the exposure optical system in a substrate photolithography machine or the inspection optical system in

substrate inspection equipment is established above the upper surface of the rectangle board 2.

[0005] In order to detect the position of the rectangle board 2 and to position to a predetermined target position to the above-mentioned optical system in such positioning equipment First, it takes out one rectangle board 2 at a time from a loader part by the robot hand of an illustration abbreviation, and conveys in a predetermined course, as Arrow J shows to drawing 4 , it sends out, and it lays in the upper surface of the substrate zipper 1. At this time, as the rectangle board 2 shows drawing 5 to a predetermined target position by the variation by conveyance of the above-mentioned robot hand, a position gap may be caused.

[0006] Here, each edge sensor 3a shown in drawing 4 , 3b, and 3c carry out scanning operation still like Arrow D, E, and F, and detect optically the periphery of each neighborhood of two sides of rectangular crosses from the state which approached the rectangle board 2 as shown in Arrow A, B, and C, respectively. That is, as shown in drawing 5 , the first edge sensor 3a detects a point P1 (x1, y1), the second edge sensor 3b detects a point P2 (x2, y2), and the third edge sensor 3c detects a point P3 (x3, y3). These signal detection is performed in the detector circuit 6 shown in drawing 4 . In this case, the current positions of the direction of the X-axis of the rectangle board 2 detected as mentioned above are the coordinates x3 of a point P3, and the current position of the direction of the Y-axis is set to (y1+y2) / 2 from a point P1 and Y coordinates of P2. Moreover, similarly the inclination angle theta over the direction of the X-axis of the main axis 7 of this rectangle board 2 is from a point P1, and X of P2 and Y coordinates, $\theta = \tan^{-1}\frac{y_1 - y_2}{x_1 - x_2}$ ... (1)

It becomes.

[0007] If the predetermined target position of the above-mentioned rectangle board 2 is made into the starting point Q of coordinates x0 in the direction of the X-axis and it is the starting point R of coordinates y0 in the direction of the Y-axis in drawing 4 now As shown in drawing 5 , about the rectangle board 2 conveyed and laid, the amount of gaps of the direction of the X-axis is set to (x0-x3), and the amount of gaps of the direction of the Y-axis is set to {y0- (y1+y2)/2}. Moreover, the inclination angle theta over the direction of the X-axis of this rectangle board 2 is as an above-mentioned formula (1). What is necessary is just to make it this amount of gaps serve as zero, since the amount of gaps to the predetermined target position of the rectangle board 2 laid by above-mentioned conveying by these is known.

[0008] Therefore, each above-mentioned amount of gaps is recognized in the data-processing control circuit 8 shown in drawing 4 , position amendment processing for making it into zero is performed, and the amendment processing signal S1 is sent out to the table drive control circuit 9. And the drive control signal S2 is sent out to the trolley table (illustration abbreviation) which is supporting said substrate zipper 1, and only the quantity corresponding to the above-mentioned amendment processing signal S1 moves this trolley table in the direction of X, and the direction of Y, and this table drive control circuit 9 is rotated in the direction of theta. Thereby, in drawing 4 , while the periphery of two sides of rectangular crosses of the above-mentioned rectangle board 2 is in agreement with the starting points Q and R, respectively, it becomes zero, and inclination also agrees in a predetermined target position and is positioned in it.

[0009] [in the case of above-mentioned drawing 4 , prepare two edge sensors 3a and 3b in this neighborhood

side as a standard line which recognizes the inclination angle / as opposed to the direction of the X-axis for the long side side of two sides of rectangular crosses of the rectangle board 2 / theta, but] It may be specified as a standard line which recognizes the inclination angle [as opposed to the direction of the X-axis for the shorter side side of two sides of rectangular crosses of the above-mentioned rectangle board 2] theta depending on a demand of a user. At this time, as shown in drawing 6 , the first edge sensor 3a will be formed in the central part by the side of the long side of two sides of rectangular crosses of the above-mentioned rectangle board 2, and only predetermined distance will detach and arrange the second edge sensor 3b and the third edge sensor 3c along with the shorter side side of two sides of rectangular crosses of this rectangle board 2.

[0010] The account of the upper when each edge sensor 3a, 3b, and 3c have been arranged according to different user requirements The first edge sensor 3a detects a point P1 (x1, y1) about one by the side of a long side, the second edge sensor 3b detects a point P2 (x2, y2) about certain one by the side of a shorter side, and the third edge sensor 3c detects a point P3 (x3, y3) about other one by the side of a shorter side. At this time, the current position of the direction of the X-axis of the rectangle board 2 detected as mentioned above is set to (x2+x3) / 2 from a point P2 and X coordinates of P3, and the current positions of the direction of the Y-axis are the coordinates y1 of a point P1. Moreover, make the inclination angle theta over the direction of the X-axis of the main axis 7 of this rectangle board 2 be the same as that of a formula (1) from X of the above-mentioned point P<SUB>2 and P3, and Y coordinates. $\theta = \tan^{-1}\frac{x_2 - x_3}{y_2 - y_3}$ … (2)

It becomes.

[0011] If the predetermined target position of the above-mentioned rectangle board 2 is made into the starting point Q of coordinates x0 in the direction of the X-axis as shown at drawing 4 in the case of this drawing 6 , and it is the starting point R of coordinates y0 in the direction of the Y-axis As shown in drawing 6 , about the rectangle board 2 conveyed and laid, the amount of gaps of the direction of the X-axis is set to {x0- (x2+x3)/2}, and the amount of gaps of the direction of the Y-axis is set to (y0-y1). Moreover, the inclination angle theta over the direction of the X-axis of this rectangle board 2 is as an above-mentioned formula (2). Since the amount of gaps to the predetermined target position of the rectangle board 2 laid by above-mentioned conveying by these is known, position amendment processing is performed like the above-mentioned in the data-processing circuit 8 and the table drive control circuit 9 so that this amount of gaps may serve as zero. Thereby, it is agreed and positioned in a predetermined target position.

[0012]

[Problem to be solved by the invention] However, it sets to the positioning equipment of such a conventional rectangle board. As shown in drawing 4 , only predetermined distance detaches and arranges two edge sensors 3a and 3b along the periphery of one neighborhood of two sides of adjacency ****** rectangular crosses of the substrate zipper 1. Since one edge sensor 3c was formed in the central part of the periphery of the neighborhood of another side which intersects perpendicularly with above-mentioned one neighborhood The correspondence was not easy when the standard line which recognizes the inclination angle theta over the direction of the X-axis of the rectangle board 2 by the difference of user requirements changed in one

neighborhood and the neighborhood of another side, as shown in drawing 5 and drawing 6 . Namely, in order to recognize the inclination angle theta over the direction of the X-axis of the above-mentioned rectangle board 2 Although two edge sensors must be arranged to the side in which the standard line is located When it inclined by the difference of user requirements and the standard line of angle theta changed, the change of design of whether two edge sensors are arranged had to be carried out, and the attaching position had to be changed into which neighborhood side of two sides of rectangular crosses each time. Moreover, the formula of the position amendment processing program in the data-processing control circuit 8 shown in drawing 4 also had to be changed. Therefore, while it was complicated to have dealt with change of the standard line of positioning by the difference of the above-mentioned user requirements, it was difficult, and time was also taken, and expense was also this thing. Moreover, in the edge sensor 3c formed in one shorter side side shown in drawing 4 , it was what approach of the direction of arrow C or the movement magnitude of evacuation must move even a main axis greatly from the 1 side neighborhood of the rectangle board 2, and the mechanism large-sized-izes.

[0013] Then, this invention copes with such a problem and aims at offering the positioning equipment of a rectangle board which can respond to change of the standard line of positioning which changes with user requirements in what positions a large-sized rectangle board in the state of non-contact easily.

[0014]

[Means for solving problem] [the positioning equipment of the rectangle board by this invention] in order to attain the above-mentioned purpose Movement of the two dimensions of the direction of X, and the direction of Y, and the trolley table which can rotate the direction of theta, It has the substrate zipper of the shape of a rectangle which puts a rectangle board on the upper surface and is held while being fixed to the upper surface of this trolley table and carrying out movement of X, Y, and the direction of theta with this trolley table. In the positioning equipment of the rectangle board which positions the above-mentioned rectangle board to a predetermined target position to the optical system established above this substrate zipper While detaching only predetermined distance and arranging two edge sensors which detect optically the periphery of each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle board held on the upper surface of this substrate zipper near [each] each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle substrate zipper of the above A position amendment means to take in the position signal of the periphery of two sides of rectangular crosses of the rectangle board detected by every two above-mentioned edge sensors, to recognize the position of the direction of X and the direction of Y and the angle of the direction of theta, and to amend a position to the target position of this rectangle board is established. Every two above-mentioned edge sensors are used by whether which neighborhood of two sides of rectangular crosses of this rectangle board is taken as a standard line which recognizes the angle of the direction of theta of the above-mentioned rectangle board, switching them mutually. It is made to carry out recognition and amendment of the rectangle board of the angle of the direction of theta.

[0015] Moreover, each above-mentioned edge sensor enables scanning operation for detecting the periphery of the above-mentioned neighborhood optically in the approach position while enabling approach or evacuation to the neighborhood where the rectangle board held on the upper surface of the substrate zipper corresponds.

[0016] Furthermore, let each above-mentioned edge sensor be a penetrated type or a reflected type photo sensor.

[0017]

[Mode for carrying out the invention] The form of operation of this invention is hereafter explained in detail based on an accompanying drawing. Drawing 1 is the plane explanatory view seen from the upper surface side of the rectangle board which shows the embodiment of the positioning equipment of the rectangle board by this invention, and drawing 2 is the front explanatory view which looked at the substrate zipper from the front side. In the substrate photolithography machine with which the positioning equipment of this rectangle board prints the circuit pattern formed in the mask, for example on the rectangle boards (glass substrate etc.) held on the upper surface of the substrate zipper It is what positions a rectangle board to a predetermined target position to the optical system established above the above-mentioned substrate zipper on the occasion of position ****** of the above-mentioned mask and a rectangle board. As shown in drawing 1 and drawing 2 , it has the trolley table 10, the substrate zipper 1, the edge sensor 3a, 3b, 3c, 3d, the data-processing circuit 7, and the table drive control circuit 8.

[0018] In drawing 2 , movement of the two dimensions of the direction of X and the direction of Y and rotation of the direction of theta of the trolley table 10 are enabled in the level surface by the source of a drive besides illustration, and X table which moves in the direction of X, Y table which moves in the direction of Y, and theta table which rotates in the direction of theta are accumulated up and down. The substrate zipper 1 is being fixed to the upper surface of the above-mentioned trolley table 10. The rectangle board 2 is put on that upper surface, and this substrate zipper 1 is held, and as shown in drawing 1 , it is formed in the shape of a rectangle, while movement of X, Y, and the direction of theta is carried out with the above-mentioned trolley table 10. In addition, although the illustration abbreviation was carried out, two or more vacuum suction holes for carrying out adsorption maintenance of the above-mentioned rectangle board 2 are prepared in the upper surface of this substrate zipper 1 at the proper interval. Moreover, the above-mentioned rectangle board 2 is a large-sized glass substrate (400mm x 500mm or more), for example, and the periphery part has projected it outside the circumference of the substrate zipper 1, as shown in drawing 1 and drawing 2 .

[0019] The optical system 11 is established above the above-mentioned substrate zipper 1. This optical system 11 is an exposure optical system in a substrate photolithography machine, is an inspection optical system in substrate inspection equipment, and it is constituted so that a focus may be connected on the field of the rectangle board 2 by which installation maintenance is carried out on the upper surface of the substrate zipper 1.

[0020] Here, in this invention, near [each] each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle substrate zipper 1 of the above, only predetermined distance separates mutually and the edge sensor 3a, 3b;3c, and two 3 d are arranged. These edge sensor 3a-3d is what detects optically the periphery of each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle board 2 held on the upper surface of the above-mentioned substrate zipper 1. For example, along with the long side side of the above-mentioned rectangle board 2, the first edge sensor 3a and the second edge sensor 3b are formed

symmetrically with the main axis 12 of the direction of the Y-axis, and the third edge sensor 3c and the fourth edge sensor 3d are formed symmetrically with the main axis 13 of the direction of X axis along with the shorter side side of this rectangle board 2. the above -- each -- [, respectively as the floodlighting part 14 and the light sensing portion 15 sandwiched the periphery part of the rectangle board 2, they have countered up and down, and] edge sensor 3a-3d as shown in drawing 2 By irradiating for example, laser light downward from the above-mentioned floodlighting part 14, receiving light by a light sensing portion 15, and intercepting this irradiation laser light in the periphery of the above-mentioned rectangle board 2, it operates so that that position may be detected.

[0021] in addition, each above-mentioned edge sensor 3a, 3b;3c, the cylinder 4a that boiled 3d, respectively and was attached, and 4b;4c -- the approach and evacuation to the rectangle board 2 are enabled by 4d like Arrow A, B, and C and D. Moreover, each above-mentioned cylinder 4a, 4b; a pulse motor 5a, 5b;5c, and 5d are attached to 4c and 4d, respectively, and scanning operation for said edge sensor 3a, 3b;3c, and 3d to detect the periphery of the rectangle board 2 like Arrow E, F;G, and H is enabled. Furthermore, each above-mentioned edge sensor 3a, 3b; the detection signal detected at 3c and 3d is taken in in the detector circuit 6 shown in drawing 1 R> 1. in addition, this detector circuit 6 -- the above -- each -- it is classified corresponding to edge sensor 3a-3d, and a detection signal is delivered by 1 to 1.

[0022] Moreover, the data-processing control circuit 8 and the table drive control circuit 9 are established in the output side of the above-mentioned detector circuit 6. the above-mentioned data-processing control circuit 8 was taken in in the detector circuit 6 -- each -- [an edge sensor 3a-3d detection signal is inputted, and / rectangular crosses / of said rectangle board 2 / two sides of / predetermined / the position of the direction of X, and the direction of Y, and the angle of the direction of theta / recognize and] While recognizing the amount of gaps to a predetermined target position, position amendment processing for making it into zero is performed, MPU, a memory, etc. as an operation processing unit are prepared in the inside, and the amendment processing signal S1 is outputted. The table drive control circuit 9 is the thing which inputs the amendment processing signal S1 outputted from the above-mentioned data-processing control circuit 8, and only the quantity corresponding to this amendment processing signal S1 makes move said trolley table 10 in X, Y, and the direction of theta. The drive control signal S2 is sent out to the above-mentioned trolley table 10.

[0023] [in and the above-mentioned data-processing control circuit 8 and the table drive control circuit 9] Every two above-mentioned edge sensors 3a, 3b; a position amendment means to take in the position signal of the periphery of two sides of rectangular crosses of the rectangle board 2 detected at 3c and 3d, to recognize the position of the direction of X and the direction of Y and the angle of the direction of theta, and to amend a position to the target position of this rectangle board 2 is constituted.

[0024] Next, operation of the positioning equipment of the rectangle board by this invention constituted in this way is explained with reference to drawing 1 - drawing 3 . First, it takes out one rectangle board 2 at a time from a loader part by the robot hand of an illustration abbreviation, and conveys in a predetermined course, as Arrow J shows to drawing 1 , it sends out, and it lays in the upper surface of the substrate zipper 1. At this time, as the rectangle board 2 shows drawing 3 to a predetermined target position by the variation by conveyance of the

above-mentioned robot hand, a position gap may be caused.

[0025] Next, each edge sensor 3a shown in drawing 1 , 3b; scanning operation is carried out still like Arrow E, F, and G and H, and 3c and 3d of peripheries of each neighborhood of two sides of rectangular crosses are optically detected from the state which approached the rectangle board 2 as shown in Arrow A, B, and C and D, respectively. That is, as shown in drawing 3 , the first edge sensor 3a detects a point P1 (x1, y1), the second edge sensor 3b detects a point P2 (x2, y2), the third edge sensor 3c detects a point P3 (x3, y3), and the edge sensor 3d of the fourth ** detects a point P4 (x4, y4). And these signal detection is performed in the detector circuit 6 shown in drawing 1 .

[0026] When it is the standard line which recognizes now the inclination angle [as opposed to the direction of the X-axis for the long side side of two sides of rectangular crosses of the rectangle board 2 shown in drawing 1] theta, in this case The current position of the direction of the X-axis of the rectangle board 2 detected as shown in drawing 3 is set to (x3+x4) / 2 from a point P3 and X coordinates of P4, and the current position of the direction of the Y-axis is set to (y1+y2) / 2 from a point P1 and Y coordinates of P2. Moreover, similarly the inclination angle theta over the direction of the X-axis of the main axis 7 of this rectangle board 2 (refer to mark 13) is from a point P1, and X of P2 and Y coordinates, $$\theta = \tan^{-1}\frac{y_1 - y_2}{x_1 - x_2} \quad \cdots (3)$$

It becomes. In addition, this formula (3) is completely the same as the above-mentioned formula (1).

[0027] Moreover, if the predetermined target position of the above-mentioned rectangle board 2 is made into the starting point Q of coordinates x0 in the direction of the X-axis and it is the starting point R of coordinates y0 in the direction of the Y-axis in drawing 1 As shown in drawing 3 , about the rectangle board 2 conveyed and laid, the amount of gaps of the direction of the X-axis is set to {x0- (x3+x4)/2}, and the amount of gaps of the direction of the Y-axis is set to {y0- (y1+y2)/2}. And the inclination angle theta over the direction of the X-axis of this rectangle board 2 is as an above-mentioned formula (3). What is necessary is just to make it this amount of gaps serve as zero, since the amount of gaps to the predetermined target position of the rectangle board 2 laid by above-mentioned conveying by these is known.

[0028] Therefore, each above-mentioned amount of gaps is recognized in the data-processing control circuit 8 shown in drawing 1 , position amendment processing for making it into zero is performed, and the amendment processing signal S1 is sent out to the table drive control circuit 9. And the drive control signal S2 is sent out to the trolley table 10 (refer to drawing 2) which is supporting said substrate zipper 1, and only the quantity corresponding to the above-mentioned amendment processing signal S1 moves this trolley table in the direction of X, and the direction of Y, and this table drive control circuit 9 is rotated in the direction of theta. Thereby, in drawing 1 , while the periphery of two sides of rectangular crosses of the above-mentioned rectangle board 2 is in agreement with the starting points Q and R, respectively, it becomes zero, and inclination also agrees in a predetermined target position and is positioned in it.

[0029] Next, the case where it is specified as a standard line which recognizes the inclination angle [as opposed to the direction of the X-axis for the shorter side side of two sides of rectangular crosses of the above-mentioned rectangle board 2] theta by demand of a user unlike an above-mentioned case is explained. Since

every two edge sensors 3a, 3b;3c, and 3d are beforehand prepared in the long side [of two sides of rectangular crosses of the rectangle board 2], and shorter side side unlike the former at this time as shown in drawing 1 R> 1, it is not necessary to reshuffle the personnel in particular by a change of design. Therefore, each edge sensor 3a, 3b;3c, and 3d detect optically the periphery of each neighborhood of two sides of rectangular crosses of the rectangle board 2 like last time. The current position of the direction of the X-axis of the rectangle board 2 detected as shown in drawing 3 also in this case is set to (x3+x4) / 2 from a point P3 and X coordinates of P4, and the current position of the direction of the Y-axis is set to (y1+y2) / 2 from a point P1 and Y coordinates of P2. Moreover, as for the inclination angle theta over the direction of the X-axis of the main axis 7 of this rectangle board 2 (refer to mark 13), next time is from the point P3 describing above, and X of P4 and Y coordinates,

$$\theta = \tan^{-1} \frac{x_3 - x_4}{y_3 - y_4} \quad \cdots (4)$$

It becomes. Namely, what is necessary is just to use it for the third edge sensor 3c and the fourth edge sensor 3d in this case, switching as an object for detection of the inclination angle theta.

[0030] Also in this case, if the predetermined target position of the above-mentioned rectangle board 2 is made into the starting point Q of coordinates x0 in the direction of the X-axis and it is the starting point R of coordinates y0 in the direction of the Y-axis in drawing 1 About the rectangle board 2 conveyed and laid as shown in drawing 3 , like the above-mentioned, the amount of gaps of the direction of the X-axis is set to {x0- (x3+x4)/2}, and the amount of gaps of the direction of the Y-axis is set to {y0- (y1+y2)/2}. And the inclination angle theta over the direction of the X-axis of this rectangle board 2 is as an above-mentioned formula (4). Since the amount of gaps to the predetermined target position of the rectangle board 2 laid by above-mentioned conveying by these is known, position amendment processing is performed like the above-mentioned in the data-processing circuit 8 and the table drive control circuit 9 so that this amount of gaps may serve as zero. Thereby, it is agreed and positioned in a predetermined target position.

[0031] [according to the positioning equipment of the rectangle board by this invention] as mentioned above Every two above-mentioned edge sensors 3a, 3b;3c, and a 3d group are used by whether which neighborhood of two sides of rectangular crosses of this rectangle board 2 is taken as a standard line which recognizes the angle of the direction of theta of the rectangle board 2 of the object to position, switching them mutually. Recognition and amendment of the rectangle board 2 of the angle of the direction of theta can be carried out.

[0032] in addition -- in the above explanation -- each -- edge sensor 3a-3d although it was considered as the penetrated type photo sensor which isolated between predetermined and the floodlighting part 14 and the light sensing portion 15 were made to counter up and down This invention is good also as a reflected type photo sensor which adjoins and forms not only this but the floodlighting part 14, and a light sensing portion 15 in the same side side of the rectangle board 2, and received catoptric light. moreover -- in drawing 1 , the substrate zipper 1 does not move greatly -- each -- although edge sensor 3a-3d is moved to the rectangle board 2 side and he is trying to detect the periphery without it is limited to this -- the above -- each -- it fixes to the starting point position where the rectangle board 2 should position edge sensor 3a-3d, and the above-mentioned substrate zipper 1 is moved and you may make it amend the position of the above-mentioned rectangle board 2

[0033]

[Effect of the Invention] Since this invention was constituted as mentioned above, while detaching only predetermined distance and arranging two edge sensors which detect optically the periphery of each neighborhood of two sides of adjacency ****** rectangular crosses of the rectangle board held on the upper surface of this substrate zipper near [each] each neighborhood of two sides of adjacency ****** rectangular crosses of a rectangle-like substrate zipper By having established a position amendment means to have taken in the position signal of the periphery of two sides of rectangular crosses of the rectangle board detected by every two above-mentioned edge sensors, to have recognized the position of the direction of X, and the direction of Y, and the angle of the direction of theta, and to amend a position to the target position of this rectangle board Every two above-mentioned edge sensors can be used by whether which neighborhood of two sides of rectangular crosses of this rectangle board is taken as a standard line which recognizes the angle of the direction of theta of the above-mentioned rectangle board, switching them mutually, and recognition and amendment of the rectangle board of the angle of the direction of theta can be carried out. Therefore, when it inclines by the difference of user requirements and the standard line of angle theta changes like before, it is not necessary to carry out the change of design of whether two edge sensors are arranged, and to change the attaching position into which neighborhood side of two sides of rectangular crosses each time. Moreover, it is not necessary to also change the formula in the data-processing control circuit shown in drawing 1 (for example, a position amendment processing program). From this, according to the positioning equipment of the rectangle board by this invention, it can respond to change of the standard line of positioning which changes with user requirements easily in a short time, and expense can also be reduced further.

[Brief Description of the Drawings]

[Drawing 1] It is the plane explanatory view seen from the upper surface side of the rectangle board which shows the embodiment of the positioning equipment of the rectangle board by this invention.

[Drawing 2] It is the front explanatory view which looked at the substrate zipper from the front side.

[Drawing 3] It is the plane explanatory view showing positioning operation of a rectangle board.

[Drawing 4] It is the plane explanatory view seen from the upper surface side of the rectangle board which shows the positioning equipment of the rectangle board by the conventional example.

[Drawing 5] It is the plane explanatory view showing positioning operation of the rectangle board corresponding to the standard line of a certain user requirements in the conventional example.

[Drawing 6] It is the plane explanatory view showing positioning operation of the rectangle board corresponding to the standard line of other user requirements in the conventional example similarly.

[Explanations of letters or numerals]

1 -- Substrate zipper

2 -- Rectangle board

3a-3d -- Edge sensor

4a-4d -- Cylinder

5a-5d -- Pulse motor

6 -- Detector circuit

8 -- Data-processing control circuit

9 -- Table drive control circuit

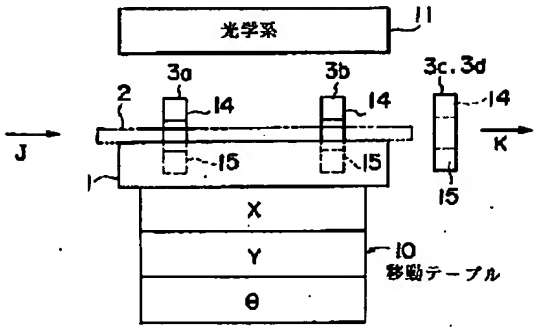
10 -- Trolley table

11 -- Optical system

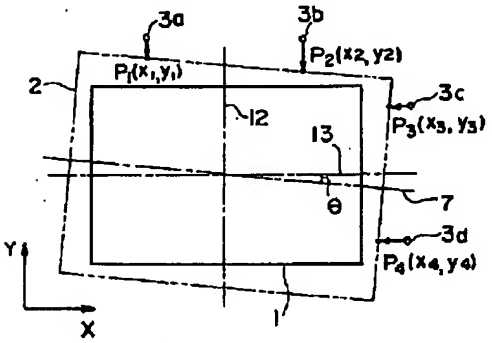
14 -- Floodlighting part

15 -- Light sensing portion

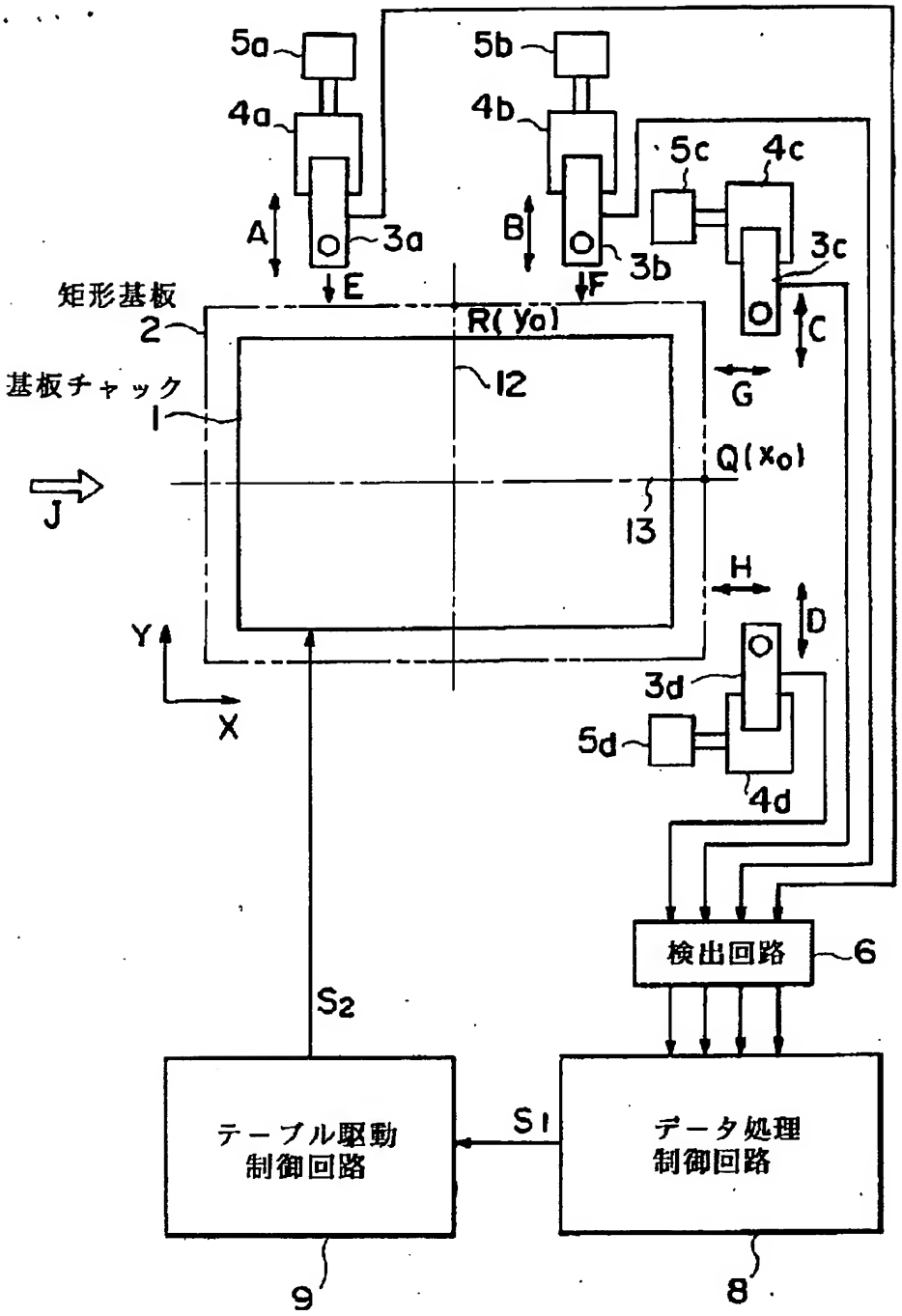
[Drawing 2]



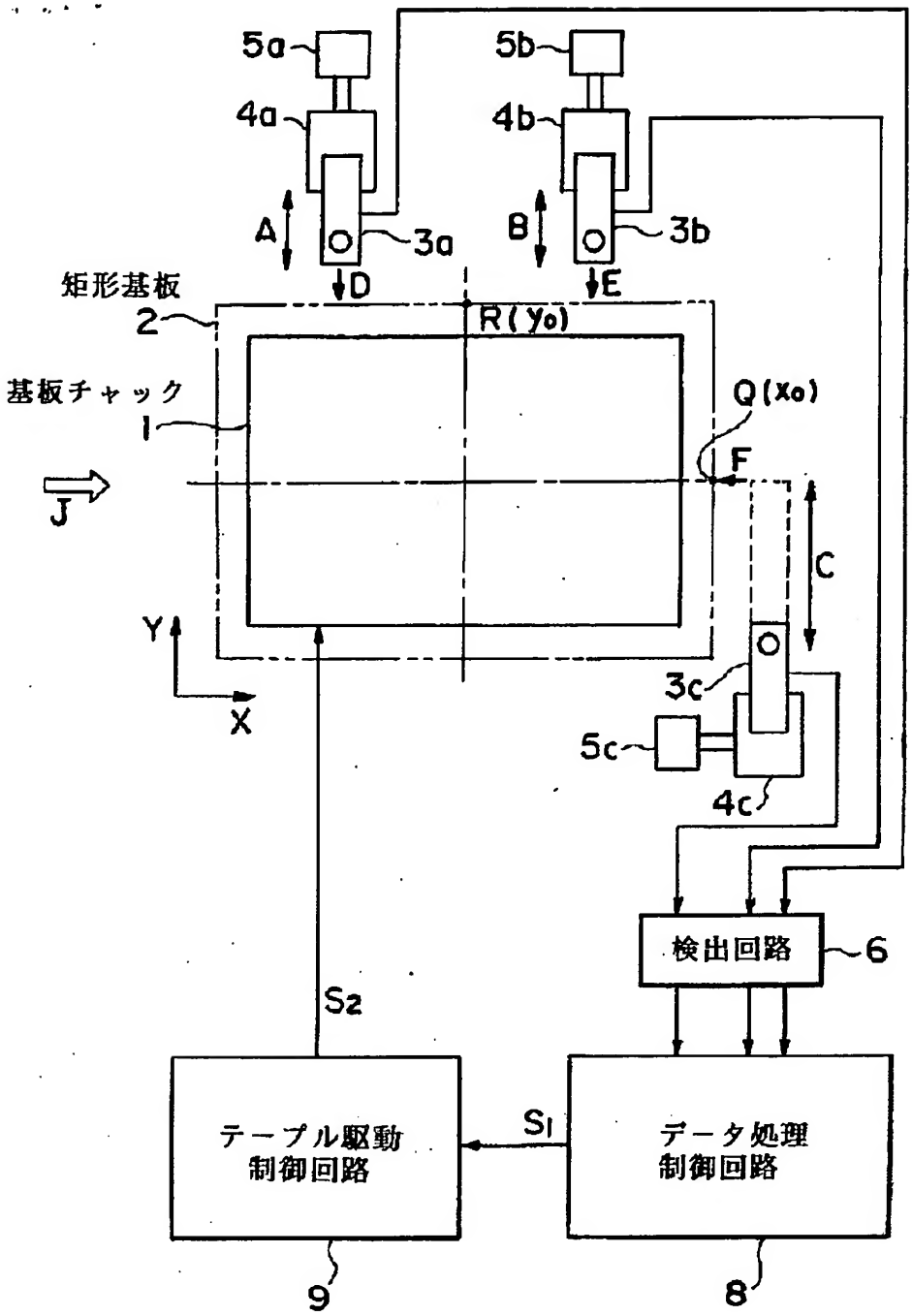
[Drawing 3]



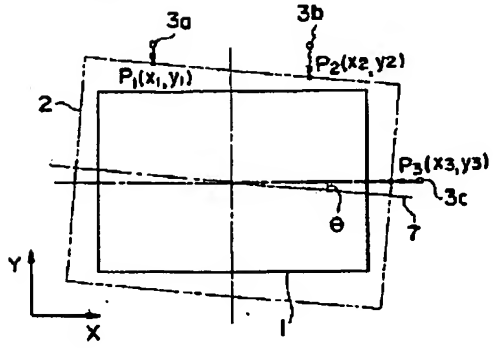
[Drawing 1]


5a
5b
4a
4b
5c
4c
A
3a
B
3b
3c
E
F
矩形基板
2
R(Ya)
C
基板チャック
1
12
G
Q(Xo)
J
13
H
D
Y
X
3d
5d
4d
検出回路
6
S2
テーブル駆動
制御回路
S1
データ処理
制御回路
9
8

[Drawing 4]



[Drawing 5]



[Drawing 6]